



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECB204 – LINEAR AND DIGITAL CIRCUITS

II YEAR/ III SEMESTER

UNIT 3 – GATES AND MINIMIZATION TECHNIQUES

TOPIC 8 - QUINE- MC CLUSKEY METHOD OF MINIMIZATION



WHY QUINE- MC CLUSKEY METHOD OF MINIMIZATION?



- k map is difficult to simplify the Boolean functions having more than 5 variables.
- Quine-McClukey tabular method is a tabular method based on the concept of prime implicants.



QUINE- MC CLUSKEY METHOD OF MINIMIZATION



Prime Implicants(PI)

- Group of minterms which cannot be combined with any other minterms or groups.

Essential Prime implicants (EPI)

- The essential prime implicant is a prime implicant in which one or more minterms are unique.
- Contains atleast one minterm which is not contained in any other.



QUINE- MC CLUSKEY METHOD OF MINIMIZATION



Prime Implicants(PI) – Two parts

Part 1 - Find all prime implicants by an Exhaustive search.

Part 2 - Identify the Essential prime implicants obtained in part 1 and select from the remaining prime implicants which can give the perfect minimized expression



QUINE- MC CLUSKEY METHOD OF MINIMIZATION



Eg.

Simplify the following boolean expression using k map and verify it using Quine – Mc Cluskey method.

$$Y(A,B,C,D) = \sum m(0,1,3,7,8,9,11,15)$$

K-Map

A \ B \ C D	00	01	11	10
00	1	1	1	0
01	0	0	1	0
11	0	0	1	0
10	1	1	1	0

$Y = \overline{B}\overline{C} + CD$



QUINE- MC CLUSKEY METHOD OF MINIMIZATION

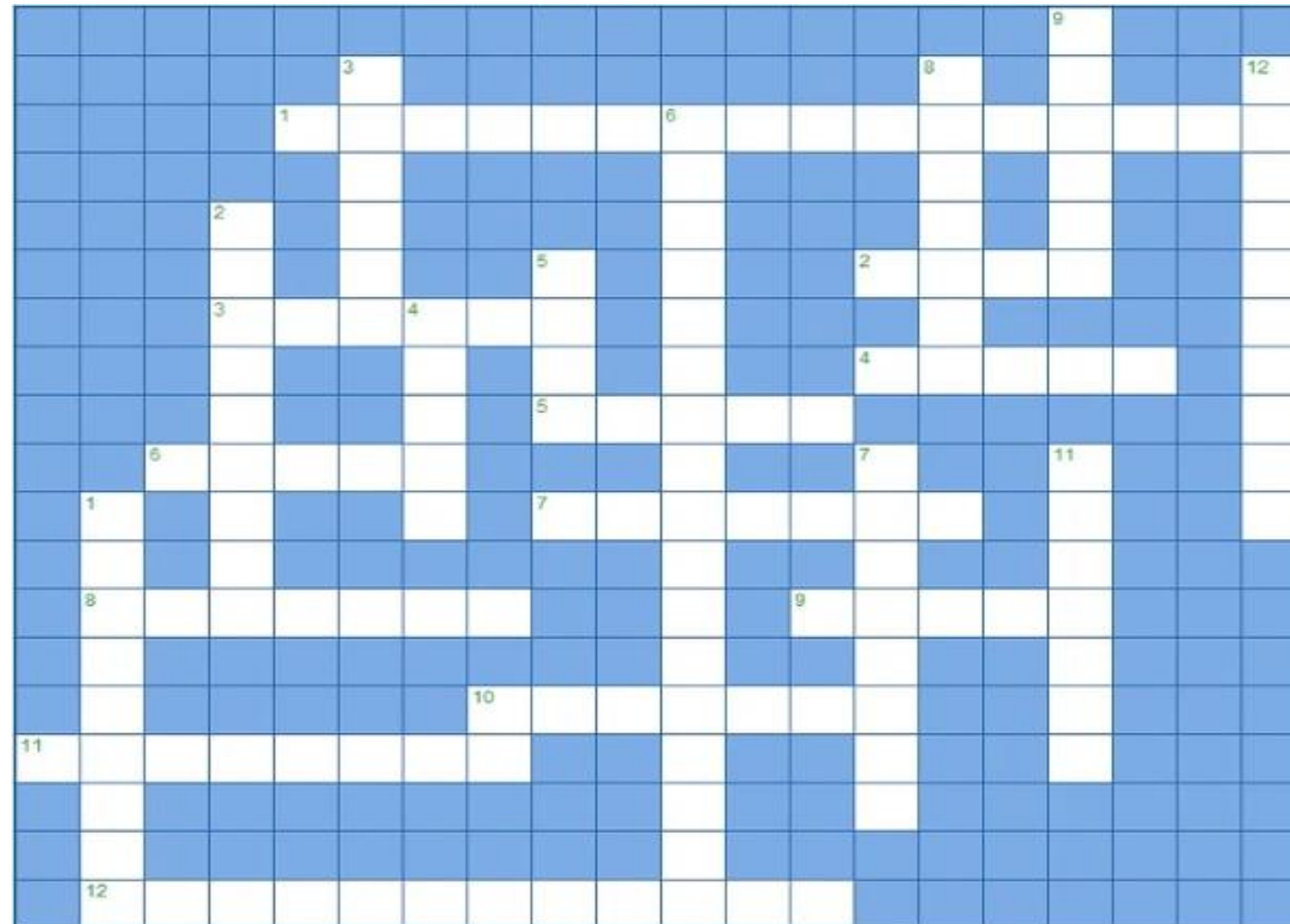


- Arrange all the minterms accordingly to number of one's contained and from the groups having no one's, one 1's, two 1's, three 1's and so on...

Group	Minterm	Representation In Binary form ABCD	
1	m0	0000	Zero 1's
2	m1	0001	one 1's
	m8	1000	
3	m3	0011	two 1's
	m9	1001	
4	m7	0111	three 1's
	m11	1011	
5	m15	1111	four 1's



ACTIVITY





Combination of Minterms into groups of two



Group	Minterm	Binary Representation
		A B C D
0	m0_ m1	0 0 0 --
	m0_ m8	-- 0 0 0
1	m1_ m3	0 0 -- 1
	m1_ m9	-- 0 0 1
	m8_ m9	1 0 0 --
2	m3_ m7	0 -- 1 1
	m3_ m11	-- 0 0 1
	m9_ m11	1 0 0 --
3	m7_ m15	-- 1 1 1
	m11_ m15	1 -- 1 1



Combination of Minterms into groups of four



Group	Minterm	Binary Representation	
		A B C D	
0	m0_ m1_ m8_ m9	-- 0 0 --	B'C'
	m0_ m8_ m1_ m9	-- 0 0 --	
1	m1_ m3_ m9_ m11	-- 0 -- 1	B'D
	m1_ m9_ m3_ m11	-- 0 -- 1	
2	m3_ m7_ m11_ m15	-- -- 1 1	CD
	m5_ m11_ m7_ m15	-- -- 1 1	

$$Y(A,B,C,D) = B'C' + B'D + CD$$



Combination of Minterms into groups of four



PI	Decimal Numbers corresponding to PI	Given minterms							
		0	1	3	7	8	9	11	15
$\bar{B}\bar{C}$	0, 1, 8, 9	⊗	x			⊗	x		
$\bar{B}D$	1, 3, 9, 11		x	x			x	x	
CD	3, 7, 11, 15			x	⊗			x	⊗



ASSESSMENTS



1. What is the another name for Quine Mc Cluskey method?
2. The starting point of the tabulation method that specifies the function is the----
3. Unchecked terms in the table forms are-----
4. What is the first tabulation method?
5. State Prime Implicants.



THANK YOU